Saskatchewan Agriculture, Food and Rural Revitalization

FARM *FACTS*

SWATH GRAZING

Introduction

Swath grazing annual cereal crops continues to be adopted by livestock producers as a method of lengthening the grazing season. In the last decade this method of providing feed for beef cows during fall and early winter has proven to be both physically possible and economically viable.

Beef cows are capable of foraging through the snow, provided an adequate feed supply has been stockpiled. Photo courtesy Wally Vanin, Forage and Rangeland agrologist.

For swath grazing to be successful, good management is required. Growing the crop, metering the windrows, feed quality, water sources and shelter are important elements that need to be carefully planned. This publication describes the management practices to ensure swath grazing is done successfully without sacrificing animal health and productivity.

Selecting Cattle

The majority of swath grazing during fall and winter months has been done with dry mature beef cows in good body condition. These animals have a lower feed quality requirement compared to calves, cows with calves, and young, old or thin cows.

Potentially, any class of livestock can be swath grazed. The important factors to consider are temperatures, snow conditions, feed quality, feed requirements and body condition of the livestock. In some conditions supplemental feeding and extra shelter may be required.

Producers have found some animals cannot adapt to swath grazing during the winter months. It is common that a portion of the cows have to be sold, culled, or managed with traditional winter feeding to remain productive. Depending upon the herd type and previous culling criteria, the percentage of cows that cannot adapt may be quite high. Producers need to evaluate their herd before starting aggressively into an extended swath grazing season. Generally small and medium framed livestock with good hair coats have the ability to adapt more successfully.

Choosing a Field

Field selection is important, especially when producers are first trying this practice with inexperienced cattle. Regardless of experience, site selection becomes more important as winter advances with more snow and colder temperatures. Consider the following points:

- The site should be close to headquarters or wherever there is stored feed and machinery available to feed it. During days of extreme cold and wind chill, cattle may need to be fed if they will not go out to graze. However this is not always necessary as livestock will graze at night when the wind speed drops.
- The site should be close to a handling facility where animals that are losing condition can be sorted and removed.
- The site needs to have shelter from wind. This can be natural bush, planted shelterbelts, permanent windbreak fences, or portable windbreak fences.
- As snow accumulates, a relatively level field is preferred. On a rolling landscape wind can create snowdrifts and bury feed in low areas.
- A winter water source will be needed if snow is not available or the snow becomes hard packed and crusted.

Crop Selection

A. Cool Season Annual Cereals

Most crops used for swath grazing are spring cereals. Oats and barley are common choices, with wheat, rye and triticale as other options. Research has shown that high yielding grain varieties generally produce high forage yields. The exceptions are the semi-dwarf varieties with short straw. These varieties should not be used.

Some varieties of oats (CDC Bell, CDC Baler, AC Murphy, Foothills) and barley (Virden, Lacombe, AC Ranger, AC Hawkeye, Westford) are promoted as forage varieties. They tend to have wider leaves, better leaf retention, and remain green later in the season.

Smooth awn varieties are preferred, as rough awns may lodge in a cow's mouth and cause lesions. For the best varieties for your area, check with your local Agriculture Extension staff.

Oats or barley can be mixed with winter cereals such as fall rye, winter wheat, or winter triticale. A winter annual seeded in spring remains vegetative during the first year, so the feed quality in the windrow will be higher. Also the winter cereal regrowth after cutting will provide high quality forage when the cattle are allowed into the windrows. The winter annuals will also be available for grazing the following spring. A suggested seeding rate for the winter annual in a mixture is 15-20 lbs/acre. Fall rye has the greatest winter hardiness.

Deep snow can accumulate in low areas of a field, making grazing more difficult.

B. Annual Legumes

Many greenfeed and silage trials have compared cereals alone with cereal/legume combinations. The results are not conclusive. In some trials the cereal/legume combination has greater yield and/or quality compared to cereals alone, and in others there are no differences.

There is limited experience with cereal/legume combinations for swath grazing. In years with wet fall conditions, the legume quickly moulded. At this point the inclusion of a legume is not recommended.

C. Warm Season Annuals

Warm season annuals (Golden German millet, Crown millet, Siberian millet, Sorghum-Sudan grass, corn) are receiving more attention as potential crop choices for swath grazing. With swath grazing, seeding date is delayed until approximately the second week of June. Warm season crops can tolerate the higher temperatures of mid-summer, and are potentially more efficient at converting limited soil moisture to forage dry matter.

Agriculture and Agri-Food Canada, Brandon has grown and winter grazed various warm season annuals. At this point, based on yield and economics, the researchers are recommending Golden German millet as the best choice for swath grazing. Initial trials in eastern Saskatchewan indicate this crop has potential.

Forage trials in Saskatchewan during 2002, 2003 and 2004 will examine cool and warm season crops grown side by side for comparative purposes. Dry matter yield, feed quality, and cost of production will be compared to help determine the best possible choices.

D. Perennials

A few producers have experimented with perennial forage regrowth for swath grazing. After haying or early season grazing, the second growth is allowed to stockpile. Prior to or immediately after a killing frost, the stand is windrowed.

Alfalfa usually has greater regrowth potential than the grasses, so most swath grazing of perennial forage has occurred on fields with a high percentage of alfalfa. There is concern the stand may be injured or killed due to livestock traffic, especially beneath the windrow. There is also concern about the potential for reduced yield the following year due to less snow cover.

In one trial hay yield was measured beneath and between windrows following a winter of swath grazing. The stand was dominated by alfalfa and the second growth cut in September created large windrows. In this circumstance the livestock were not managed in order to clean up the feed and the following spring a thick heavy mat remained. The hay yield where the windrow lay was reduced about 20 per cent compared to between the windrows. It appeared the yield loss occurred because the windrows were not adequately grazed.

Seeding date affects cutting date, forage yield, forage quality and the length of time the windrow lies in the field before grazing.

In cases where producers have grazed the windrows, they believe plants are not injured and hay yield is not reduced beneath the windrow if the soil is frozen during grazing. If grazing occurs when the soil surface becomes soft and wet during a mid winter thaw, significant damage can occur.

The economic feasibility of free choice swath grazing high quality second cut alfalfa needs to be considered. In years of high feed prices the windrows should probably be baled and sold, or fed on a metered basis with lower quality feeds.

Swath grazing perennial forages needs further research to determine the economic feasibility and associated risks.

Seeding Date

Seeding date is an important consideration for swath grazing. Seeding date has an effect on cutting date, forage yield and forage quality.

A trial in southeast Saskatchewan was conducted during 1997-2000 to determine the optimum seeding date for swath grazing oats and barley. The trial compared forage yield, forage quality at cutting and forage quality at grazing. Nine site years of data was collected.

The average seeding dates compared were June 3, June 20, and July 3. The average cutting dates were August 10, August 24, and September 7 for the three seeding dates respectively.

The conclusions of the trial were as follows:

- Dry matter yield normally decreases as seeding date is delayed. This is an expected result for cool season crops in Saskatchewan. Average yield for the seeding dates were:
  - June 3 – 4618 lbs/ac
  - June 20 – 3914 lbs/ac
  - July 3 – 3503 lbs/ac.

Summer Swath Grazing: A Different Approach

Swath grazing has traditionally been used for late fall and early winter grazing. A new approach is to consider swath grazing with cool season annual cereals (oats, barley) for late summer grazing.

With traditional winter swath grazing, the seeding date of the crop needs to be delayed until about June 10-15 (see section Seeding Date). This delays the cutting date until approximately August 15-20, which reduces the length of time the feed lies in the windrow prior to cold fall and winter temperatures. Cold temperatures prevent the feed from losing quality. The disadvantage of the delayed seeding date for cool season cereals is a yield reduction in most years. Expect forage yield to be reduced by approximately 20-25 per cent compared to a mid-May seeding date (see section Economics).

A new consideration is to seed a cool season cereal in early spring, windrow the stand by late July, and begin grazing immediately. This would provide an alternate forage through August and early September if perennial pastures are depleted. If the windrows were not needed for grazing, they could be baled.

This option is suggested as an alternative to seeding the cereal in early spring and grazing during the vegetative stage. No trials have compared forage yields on a stand where one side is grazed through summer, and the other side is allowed to grow to the soft dough stage. Estimates suggest the side that is allowed to grow to the soft dough stage may yield 50 per cent or greater forage dry matter. Trials are needed to confirm this estimate.

On one occasion the July 3 seeding date had the highest yield. This occurred on a site with a very dry spring followed by above average rainfall in summer. On another occasion the June 20 seeding date had the highest yield. Other swath grazing trials and farm demonstrations confirm that yield normally decreases as seeding date is delayed.

- Average forage quality increases as seeding date is delayed. Generally as the yield of a crop decreases due to a lack of moisture, the quality increases. Average crude protein values for the seeding dates were:
  - June 3 – 9.0 per cent
  - June 20 – 10.6 per cent
  - July 3 – 11.2 per cent.

  Average total digestible nutrients for the seeding dates were:
  - June 3 – 57.5 per cent
  - June 20 – 60.6 per cent
  - July 3 – 60.8 per cent.

  All percentages above are basis dry matter.

- The optimum seeding date for yield and quality depends on the nutrient requirements of the livestock being fed, the fertility of the soil and moisture conditions during the growing season. In this trial, June 10-15 appeared to be the optimum seeding date for swath grazing cows in second and third trimester. Other trials and farm demonstrations recommend an early-mid June seeding date in the Brown and Dark Brown soil zones, and a mid-late June seeding date in the Black and Grey Wooded soil zones.

- The forage from the later seeding dates was more palatable to the livestock.

Seed and Fertilizer Rates

Seeding rate should be increased about 25 per cent above the rate recommended for grain production. This ensures stand density and generally produces a stem that is less coarse and more palatable.

Fertilizer rate is similar for grain production, based on a soil test to determine the optimum level of nutrients required. When fields are heavily fertilized or manured, excess nitrates can accumulate in plants that are under stress from drought, frost, or long periods of cool, cloudy weather. If the stress is removed and the plants recover, nitrate levels should return to normal within several days.

Weed Control

Prior to the delayed seeding date for swath grazing, producers have a longer period of time to control perennial weeds. In crop weed control may not be necessary. In many cases the annual weeds have been cut with the crop and consumed by the livestock during grazing. If heavy weed pressure warrants herbicide application, consult the label for grazing and feeding restrictions.

Swathing

A. Crop Stage

The optimum stage for cutting depends upon the nutrient requirements of the livestock at the time they are grazing the windrows. A crop cut in earlier stages will have relatively higher quality, lower yield, and increased palatability. A crop cut in later stages will have relatively lower quality, higher yield, and decreased palatability. The general recommendation is to cut barley at the soft dough stage, and oats at the milk stage. Individual producers can adjust their cutting time as they gain experience.

There have been situations where damaged mature crops were cut with the intention of salvaging by swath grazing. Care must be taken to meter the feed to prevent grain overload, because cows will consume the mature grain heads first.

B. Early Frost

Cutting date is usually pre-determined by seeding date. However, early fall frost may require a late seeded crop to be cut sooner than planned. The crop should be cut just before or

immediately after a frost to reduce the risk of nitrate accumulating in the feed. Cereal crops from flag leaf to early dough stage are quite sensitive to frost. During flowering they are the most sensitive. A frost of –1°C for one hour can lead to a nitrate buildup in the foliage if the crop is not cut.

C. Cutting Equipment

Most producers cut the crop with a swather rather than a haybine. With swath grazing there is no need to crimp the material to speed the drying process. There has been discussion whether crimped stems would be more prone to weathering. No trials have been conducted to compare crimping and swathing.

The optimum cutting width and windrow size depends on snow conditions when grazing occurs. On fields where swath grazing is planned prior to mid November, there is a low probability that snow conditions will be adverse. In this case a narrow cutting width is preferred because the manure will be spread more evenly across the field. A wide cutting width and a large windrow are a safeguard if grazing is planned for mid winter when snow could potentially be deep and/or crusted. A larger windrow is easier for livestock to find and has more feed once it is uncovered.

Grazing Management

A. Feed Quality and Livestock Requirements

Prior to grazing, a representative sample from each field should be collected and sent for feed analysis. This will determine whether the feed quality is adequate for the needs of the livestock being grazed. There may be situations when supplemental feed is required. Producers are encouraged to consult with a livestock nutritionist.

In the majority of swath grazing trials and farm demonstrations, feed quality has been adequate or above the nutrient requirements of pregnant beef cows.

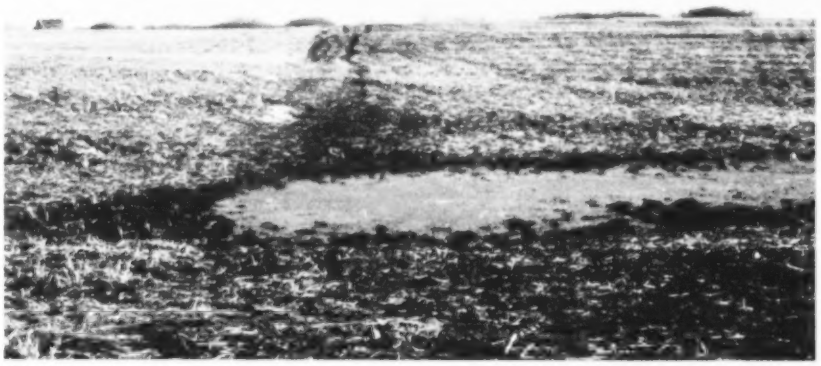
B. When to Start Grazing

Grazing can potentially begin in early fall as soon as the crop is windrowed. However, in early fall most producers will graze cheaper sources of feed such as stockpiled perennial forage, crop residue, sloughs, and chaff rows. These feed sources are relatively easy for livestock to graze prior to snowfall.

Grazing normally begins when snow depth prevents grazing other sources of feed or when other sources of feed run out. Experienced cows can readily uncover windrows underneath the snow. Inexperienced cows should be introduced to swath grazing prior to heavy snowfall.

C. Metering the Windrows

Controlling livestock access to the windrows is critical for successful swath grazing. Smaller areas and frequent moves (1-2 days) will ensure a more uniform diet and less feeding loss, but require more time to move fence. In many cases producers have found a 4-5 day supply of feed given with each move is optimum. Larger feed supplies (14-21 days) have been given at a time and grazed successfully, but the risks are greater.



Muddy soil conditions can result in excessive trampling losses. Livestock need to feed elsewhere until the soil dries or freezes. Photo courtesy of Terry Young.

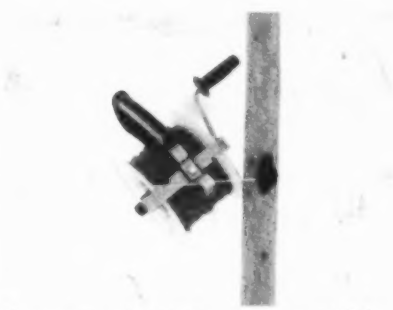
Consider the following points:

- When livestock are given access to a new area they scatter and pick through all the windrows, eating the higher quality material first. If livestock are moved at 20 day intervals, feed quality during the last 10 days could potentially be lower than the livestock requirements. This could be an important consideration during cold temperatures.
- Even when snow is relatively deep, initially when livestock are turned into an area they will open up and start grazing all the windrows. If the snow drifts it can pack in and cover the windrows again The drifted snow may be too hard for the livestock to graze through, resulting in reduced grazing during winter. In some cases partially grazed windrows have been salvaged with spring grazing.
- Dry or frozen soil conditions help to keep trampling losses to a minimum. When the soil is wet and muddy it may be necessary to move the livestock each day to minimize trampling. In one case a producer stopped swath grazing for a week and fed bales because of excessive trampling loss in muddy soil. When the soil froze again, the livestock were returned to swath grazing.
- The livestock can be encouraged to graze the last of the available material by feeding bales or silage prior to moving. As the animals remain on an area for an extra day or two, they keep returning to the windrows to finish the grazing.

Fencing

A temporary electric fence is a simple and economical way to control livestock access to windrows. Once cattle learn to respect an electric fence, it becomes an effective tool for control.

Energizers should have plenty of power. Where electricity is available, 110 volt units are recommended for cost, reliability, and low maintenance. Battery-powered energizers need to be checked and recharged on a regular basis. A heavy duty, deep cycle battery should be used. Put the battery in an insulated box for further protection and longer use. If using a solar-powered fence, place the panels in open sunlight and keep them free of snow. Check frequently to ensure there is adequate power, and keep backup batteries available.



Temporary electric fence is essential for efficient use of the windrows.

Good grounding with proper ground rods is essential. The insulating factor of snow and frozen soil can restrict the fence's ability to deliver a shock. In many cases one wire has been adequate. Some cases may require a two-wire fence where one wire is electrified and one is grounded.

Producers are commonly using polywire or polytape on a reel. These products are visible, durable, and very easy to roll up and move to the next area to be grazed.

There are numerous options for posts. Wooden posts can be pounded in fall before frost, and pulled in spring after frost. Rebar and fibreglass posts can be set in winter using a cordless drill to dig the hole. Rebar has also been fastened upright onto portable discs. If snow conditions are suitable, posts can be held upright simply by pushing them into the snow. Good insulators on the posts are recommended in all cases.

Grazing in the Snow

Experienced cows can graze through two feet of soft snow. Normally the snow remains relatively soft on top of and

around a windrow prior to grazing. Once grazing begins and the windrow is opened up, snow drifting over top can make grazing difficult or impossible. Severely crusted snow prior to grazing is also a potential problem. At a point the animal's nose will become tender and lower leg hair can be rubbed off. When this happens, either start feeding or move the livestock to a new set of windrows.

When conditions are adverse, it may be possible to blade snow off the windrows or drive on the windrow to break a crust. Some fields will have low lying areas and other places where snow can accumulate. If the field is planned for mid winter grazing when snow could potentially be deep, these areas can be baled or grazed earlier in fall.

A significant threat to swath grazing is rain followed by wet snow. On November 1, 2000, southeast Saskatchewan had 1-3 inches of rain followed by 18 inches of wet snow and freezing

The yardstick in front of the cow measures 20 inches of snow on top of the windrow.

Photo courtesy Dennis Brown, Tugaske.

temperatures. The rain made the topsoil soft and muddy. This in itself would not have been a problem, as freezing temperatures after would have frozen the soil. However, the snow acted as insulation and prevented the soil from freezing. When grazing started the livestock opened the windrows and pushed snow into the water-soaked feed. They also pushed feed into the mud. The windrow became an ice pack over night. Generally, the feed use was about 50 per cent during winter. Producers were able to salvage about half of the remaining material with spring grazing.

A good option during adverse grazing conditions is to meter the feed using short intervals of 1-2 days.

Grazing in spring is an option for cleaning up the windrows, however, producers should strive to have the windrows cleaned up during the initial grazing.

Snow as a Water Source

The University of Alberta has conducted several studies using snow as a water source for cattle. Pregnant cows using snow as their only water source were compared to cows with access to water. The differences in subcutaneous fat, calf's birth weight and calf's weaning weight were not significantly different. It is recommended lactating cows be given access to water.

The following are points about using snow as a water source:

- Inexperienced cows need to be trained. It will take 1-3 days for them to learn to eat snow.
- The snow needs to be relatively soft. Trampled, drifted or crusted snow is difficult to consume and not reliable.
- The snow should be near the feed. Livestock will alternate between feeding periods and snow intake. They need access to snow at all times during the day.
- Cows eat enough snow to equal normal water intake.
- Monitor the animals and snow conditions closely. If the livestock show signs of stress from lack of water, provide an adequate water source.

Rain followed immediately by heavy wet snow and freezing teperatures made swath grazing difficult in SE Saskatchewan in the fall of 2000. A crowbar was used to loosen the bottom half of the windrow off the soil surface.

Feed Quality Loss from Cutting to Grazing

The 1997-2000 swath grazing trial previously discussed in section "Seeding Date" measured feed quality loss in the windrow from cutting to grazing. Average cutting dates for the June 3, June 20 and July 3 seeding dates were August 10, August 24 and September 7 respectively. In all cases the windrows were grazed after freeze-up in November. In some cases grazing did not occur until January.

It was expected the windrows cut in early August would lose significantly more feed quality due to weathering, especially in a wet fall. However, this did not happen. The fall of 1998 was very wet and humid, and the feed quality losses were similar to those in dry years after cutting.

Average crude protein losses were 0.6-0.9 percentage points. Average total digestible nutrient losses were 2.9-3.6 percentage points. Considering long-term average feed costs, there was no time the economic loss of feed quality in the windrow justified the cost of baling the windrow.

Carrying Capacity

Swath grazing trials and farm demonstrations report a very wide range in carrying capacity, from 28 to 180 cow days/acre. This large variation is due to differences in crop yield, cow size, temperatures during grazing and grazing losses.

Forage yield can be measured by clipping small areas and weighing the material after it is dry. An alternative is to estimate forage yield by using a formula based on projected grain yield. With barley, the whole plant weight at soft dough stage is approximately double the grain yield at maturity.

For example, a barley crop at the soft dough stage is projected to yield 50 bushels/acre grain if it is allowed to mature. The grain yield is 50 bus/ac X 48 lbs/bus = 2400 lbs/ac. Therefore, the whole plant yield at soft dough stage is about 4800 lbs/ac. Because of cutting height of the swather, the yield in the windrow should be approximately 4400 lbs/ac.

This formula is based on average crop height. Short stands would yield less forage relative to grain and tall stands would yield more forage relative to grain.

Utilization rate of the forage depends on livestock intake and ungrazed or wasted feed. Daily dry matter intake rates are normally considered 2.6 per cent of body weight/day. A cow weighing 1300 lbs can be expected to consume about 34 lbs of dry matter forage/day.

Swath grazing trials report a wide variation in utilization rates, from 1.9-5.0 per cent of body weight/day. The low rates occur during mild temperatures when very little feed is left ungrazed. The high rates occur

during very cold temperatures and adverse snow conditions, or during muddy conditions when a significant amount of forage is left ungrazed or trampled. In many cases, windrows are grazed again the following spring to salvage the leftover forage.

Wildlife Considerations

Producers should assess potential conflicts with wildlife before swath grazing. Problems are most often associated with elk and white-tailed deer, but geese have caused problems in some cases. In a swath grazing survey, 23 percent of producers reported wildlife damage to windrows. Most of these occurred in the Black and Grey Wooded soil zones.

Deer and elk will consume feed and foul the windrow. They will also spread and trample the windrow, allowing snow to sift over top and pack in. This makes grazing by livestock afterward more difficult. It is reported elk and deer prefer oats compared to barley.

The severity of the winter and the amount of native feed available influence what deer and elk choose as a feed source. In areas where there is potential for problems, producers should plan to have the windrows grazed by early winter.

In Saskatchewan the Big Game and Waterfowl Crop Compensation Program through Saskatchewan Crop Insurance does not cover wildlife damage to swath graze windrows.

Economics

The economics of swath grazing has been analysed in many different ways. A conclusive analysis for all producers cannot be reached because each operation has a unique set of resources and different costs of production.

The following costs and savings are points to consider when determining if swath grazing is an economically viable option.

Costs

- Forage yield in most locations will probably be reduced because of the delayed seeding date. When a producer seeds a cool season annual cereal, they have the option of seeding in early spring and baling the greenfeed, or seeding in mid June and swath grazing.

  Delayed seeding with cool season crops will normally reduce forage yield. Current cereal crop research in Saskatchewan indicates delayed seeding from May 25 to June 15 can be expected to cause a grain yield reduction of about 20-25 per cent. Forage yields would likely be reduced by the same amount. Trials in Alberta confirm the same general yield reductions, with a range of 10-50 per cent. In some cases, delayed seeding has resulted in greater yields, but this is rare.
- Future work will examine new varieties of warm season annuals seeded in mid June. If these crops yield similar to cool season annuals seeded in early spring, and if seeding costs are similar, they will be excellent alternatives.
- Internal electric fencing is essential to control grazing of the windrows.
- Feed quality loss in the windrow is minimal, even with significant rainfall.

The economics of annuals for winter swath grazing, summer swath grazing, grazing during vegetative growth, and greenfeed bales have been debated and analyzed at length. Some believe greater effort should be spent on managing and using more acres of perennial forages. Each producer has a unique combination of resources with different costs of production. Each producer needs to determine their own best options.

Savings

- Swath grazing can save baling, hauling, stacking and feeding the bales. A project in northwest Saskatchewan from 1996-1999 compared the economics of greenfeed and swath grazing on 15 farms. The cost of baling, hauling, stacking and feeding large round bales varied significantly from one operation to another. The range was $13.64 to $47.17 per bale, with an average of $25.18 per bale.
- Swath grazing can save some or all of the bedding and manure removal costs. Average costs are $25.00 per cow for a winter.
- Mid June seeding may allow more effective perennial weed control in spring.
- The crop can be cut with a swather rather than a haybine.

Summary

Swath grazing annual spring cereals is one method to extend the grazing season to help reduce winter feeding costs. Other methods include: stockpiled native pasture, stockpiled seeded perennial forage, stockpiled sloughs and non-cropped areas on cultivated land, bale grazing, crop residues, corn grazing, and winter annuals.

Swath grazing in late fall and early winter has proven to be physically possible and economically viable for many producers. Producers considering this practice are encouraged to experiment with a small area at first, and use the information in this publication to assess the feasibility for their own operation.

Further Trials and Research

Work on testing new varieties of warm season annual crops for swath grazing should continue. Recent trials indicate these crops have good potential in both production and economics. Work should also begin on measuring the long-term effects to soil and water quality

References and Further Reading

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